strongly held—it's really a mess. Efforts to assign a neutral name often lead to angry letters and disputes," says Bairoch. "Last June, SWISSPROT was fully integrated with the EMBL [European Molecular Biology Laboratory] nucleotide database. It has taken years to get things working," he says.

Similarly, the complete genome sequences for the bacteria *Bacillus subtilis* and *Escherichia coli* are both due to be completed this year. They have many genes in common—but under different names, creating a terminological impasse for researchers trying to find genes in common. The impasse was resolved "in a semidictatorial way," says Bairoch. "The *B. subtilis* names will switch to *E. coli* nomenclature with the old names kept as synonyms."

Despite the benefits of standardization, "the lesson has been that it can be incredibly difficult to gain consensus and to agree who has the right to change schemes. Standards are too slow and expensive," says informatics researcher Tomás Flores at the EBI. He and others are pinning their hopes on a different approach: standardizing only the messages between databases rather than their internal detail. Such an approach, referred to by programmers as "object-oriented," would involve taking chunks of data and "wrapping" them in a format that is standard across all databases—hence, the only agreement needed is on the interfaces. "The goal is for a process that's invisible. Researchers interested in a particular gene or protein would get all the information available without having to know where it was stored," says EBI's Cameron.

A group of European bioinformatics centers last year won funding from the European Union to study an interface being developed by the world's largest software consortium, the Object Management Group, which comprises most major software and information technology companies. The approach, dubbed the Common Object Request Broker Architecture (CORBA), has already been embraced by companies from aircraft manufacturers to banks. "The idea behind CORBA is that biologists will never entirely agree on common formats for data entry in databases," says Flores at the EBI, one of the centers involved. So, rather than imposing external rules, the CORBA approach tries to separate data access from data management. The project will cover several of the larger nucleotide and protein sequence databases, including EMBL and SWISSPROT, and several new and emerging ones.

The CORBA approach has also been boosted by researchers' growing interest in Java, a computer language that allows software to be sent through Internet links to carry out small applications, called "applets," remotely (see *Science*, 2 August 1996, p. 591). Using Java, researchers not only can access a database, but can interrogate it in an intelligent way through applets, regardless of database format. Java will use CORBA standards as a tool allowing researchers to range freely among databases. "The success of Java makes a CORBA-based approach much more likely to become mainstream," says Flores.

But funding shortages may interfere with these ambitious plans. Some funding agencies do not see some of the new specialized databases as a core, knowledge-generating activity, so grant decisions can be capricious. Even SWISSPROT, one of the oldest protein sequence databases, was endangered last year when Swiss funding agencies threatened to withdraw funding for expansion of what they saw as an increasingly international resource. "Many funding bodies will support the creation of a new database but are less willing to fund development and continuing support for them. It's crazy, and I hope the tide of things will change." says University College London's Attwood.

But in spite of the hurdles, bioinformatics researchers are mostly confident that they will be able to lower the barriers between databases. "Over 10 years, I'm optimistic because the need for bioinformatics is so clear. An increasing fraction of biology is devoted to information handling—it's intrinsically an information science," says EBI's Sander. "The needs eventually will be met."

**–Nigel Williams**

NEUTRON SOURCES

# SINQ Quickens Pulse to Cool Its Beams

Today, the Paul Scherrer Institute (PSI) in Villach, Switzerland, formally inaugurates a $65 million neutron source that will help close one gap and bridge another. The first is the gap between supply and demand, as researchers clamor for access to neutron beams for research ranging from materials science to probing biological compounds. The new facility, called SINQ, will make a modest contribution toward solving that problem. The second gap is technological.

Neutron sources come in two distinct types: continuous sources, with neutrons provided by fission in a nuclear reactor; and pulsed sources, with neutrons produced by bombarding a neutron-rich target with proton pulses from an accelerator. Both sides have their vociferous advocates: Continuous sources produce very slow-moving, or "cold," neutrons that are ideal for probing delicate biological materials, while pulsed sources excel in time-of-flight spectrometry, where the momentum transferred from the neutrons to atoms in the sample is measured. SINQ, a new accelerator-based, or "spallation," source at PSI, has hallmarks of both: It produces a cold, continuous beam previously only seen at reactor sources. "It is quite a brave project to combine the continuous nature of a reactor and the generation of neutrons by spallation. We will all be extremely interested to see the kind of science that comes from such a source," says Colin Carlile of Britain's Rutherford Appleton Laboratory, home of ISIS, the world's most powerful spallation source.

Both types of source produce energetic neutrons that researchers must first "cool" by passing them through a "moderator" such as water that absorbs their excess energy and reduces their velocity. But for pulsed sources, too much moderation spreads out the pulses of neutrons, and sharp pulses are essential for time-of-flight measurements.

SINQ takes a slightly different approach from other spallation sources. It uses a cyclotron to produce proton pulses that bombard the target at a very high rate, in the megahertz range. When the resulting rapid-fire neutron pulses pass through a moderator, they smear out to create a continuous neutron beam. As a result, SINQ loses the benefit of pulses but gains high-quality cold beams. "[SINQ] will be comparable to the world's best source of cold neutrons at ILL [the Institut Laue-Langevin] at Grenoble," says Albert Furrer, scientific program head at PSI.

One of SINQ's key missions will be the development of targets for the proposed European Spallation Source, a pulsed source that would produce neutron beams about 30 times as bright as those at ISIS. But the main beneficiary will be the neutron community: SINQ will welcome experimenters from universities and industry, including "materials scientists, molecular biologists, crystallographers. … We hope to have an international group of researchers," says Walter Fischer, SINQ's main project leader.

PSI

**Particle pathways.** SINQ's neutron guides direct neutrons from source to instrument.

**–Alexander Hellemans**

*Alexander Hellemans is a writer in Paris.*